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## Fact Sheet

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## **ITT's Integrated Electro-Optical Payload for GeoEye's Next-Generation Earth-Imaging Satellite, GeoEye-1**

### **Overview**

In October 2004, ITT Corporation's (Rochester, NY) Space Systems Division was selected by General Dynamics Advanced Information Systems (Gilbert, AZ) to design and build a high-performance, space borne imaging system for GeoEye's next-generation commercial imaging satellite, GeoEye-1. General Dynamics is the prime contractor for Dulles, Va.-based GeoEye (NASDAQ:GEOY). To be launched in support of the National Geospatial-Intelligence Agency's NextView program, GeoEye-1 is equipped with the most advanced technology ever used in a commercial remote sensing satellite.

ITT's GeoEye-1 integrated electro-optical payload includes the sensor subsystem, the optical telescope unit, and outer barrel assembly. The sensor was delivered to General Dynamics Advanced Information Systems in January 2007 for integration into the spacecraft. Launch is scheduled for August 2008.

### **GeoEye-1 Electro-Optical Payload:**

- Highest resolution commercial sensor ever produced
- Fastest large area collection – up to 5Gbits per second
- High image quality: large field of view, high contrast (MTF), high signal-to-noise ratio
- 11 bits quantization
- Satellite will orbit at 684 km (425 miles) above the Earth with the capability to precisely locate an object on the ground to within 3 meters of its true location on the surface of the globe
- Line scan imaging system with time delay integration
- 5-element, modified Cassegrain optical design
- Optical Sensor Assembly total system mass (weight): 452 kg (997 lbs)
- Optical Sensor Assembly total system size: 5.3 m<sup>3</sup> (187 cubic feet)



### **Key Features of ITT's Imaging Sensor for GeoEye-1**

- Simultaneous panchromatic (black & white) and 4-band color imaging (multi-spectral)
- Modular, extensively flexible and scalable platform that supports virtually any sensor configuration – government or commercial application
- Ability to customize and enlarge instrument based on customer's needs
  - Line rates, compression, and new modes (even on orbit)
- Lowest power per pixel in the industry: ¼ the industry standard
- Lowest weight per pixel in the industry: 1/6 the industry standard
- Highest image quality per pixel: 2x the industry standard
- Lower image noise; 2x improvement over current systems
  
- **Camera Modes:**
  - Simultaneous panchromatic and multispectral (pan-sharpened)
  - Panchromatic only
  - Multispectral only
- **Spatial Resolution at nadir:**
  - 0.41 meters (1.3 feet) panchromatic
  - 1.65 meters (5.4 feet) multispectral
- **Spectral Range Panchromatic:** 450-800 nm
- **Spectral Range: Multispectral:**
  - Blue: 450-510 nm
  - Green: 510-580 nm
  - Red: 655-690 nm
  - Near IR: 780-920 nm
- **Swath Width and Representative Area Sizes**
  - Swath Width: 15.2 km (9.44 miles)
  - Single point scene: 245 sq km
  - Contiguous large area: 15,000 sq km
  - Contiguous 1 degree cell size areas: 10,000 sq km
  - Contiguous stereo area: 6,270 sq km (area assumes panchromatic mode at highest line rate)
- **Off-Nadir Imaging:** Up to 30 degrees
- **Dynamic Range:** 11 bits per pixel
- **Clear Aperture:** 1.1 meter
- **Focal ratio:** 12.1
- **Nominal Focal length:** 13.3 meter
- **Total Field of view:** > 1.28 degrees
- **MTF (modulation transfer function):** >0.11
- **Image Angle:** Capable of imaging in any direction
- **Collect Capacity:**
  - Simultaneous collection of panchromatic and multispectral area
  - Approximately 700,000 sq km of panchromatic imagery per day (about the size of Texas)
  - Approximately 350,000 sq km pan-sharpened multispectral imagery per day



ITT developed key software components to ensure the quality of imagery for the NextView program. These customized components, built using ITT's leading software technologies (such as IDL and ENVI), provide tools for calibrating the onboard sensor to deliver images with the proper contrast, for inspecting imagery at the ground station to insure overall image quality, and to format imagery for both commercial and government applications.

In October 2007, GeoEye contracted ITT to begin work on the camera for GeoEye's next satellite, GeoEye-2—an advanced, third-generation satellite capable of discerning objects on the Earth's surface as small as 0.25-meter (9.75 inches) in size.

ITT also built the imaging sensor for the other satellite in the NextView program—DigitalGlobe's WorldView-1.

For additional information, visit our website at <http://www.ssd.itt.com/heritage/geoeeye.shtml>.

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